

REMARKS

In an Office Action mailed December 5, 2005, the Examiner rejected all pending claims. Claims 1-7 and 13-15 are rejected under 35 U.S.C. §103(a) over the combination of U.S. 5,254,828 to Stiebel and U.S. 6,232,572 to Kanjo. The remaining claims stand rejected under 35 U.S.C. §103 over the same references, further in combination with U.S. 2,472,368 to Cox et al. Applicants respectfully submit that the following remarks and amendments to the claims place all claims in condition for allowance.

Claim 1

Independent claim 1 stands rejected over the Stiebel and Kanjo references. The Examiner submits that it would be obvious to replace the hydraulic or pneumatic actuator of Stiebel with the servo actuator of Kanjo. Applicant respectfully disagrees. Neither the Stiebel or Kanjo reference provides a motivation for substituting the servo actuator for a hydraulic or pneumatic actuator. The Stiebel reference explicitly makes use of a hydraulic or pneumatic actuator and makes no mention of an electric actuator. Kanjo merely describes the use of a servo actuator in a welding gun but provides no teaching or motivation for substituting such an actuator into a system such as Stiebel. As such, Applicant submits that claim 1 is not obvious in combination of Stiebel and Kanjo.

However, in order to advance prosecution, claim 1 has been amended to provide that the welding gun does not include a brake operable to prevent the actuator from being back driven. As explained in Stiebel, it is critical that the weld gun include a brake to lock the electrodes in position during the weld event so as to prevent the electrodes from being spread apart by back driving the actuator. In contrast, the present invention advantageously avoids the necessity of a brake. The servo actuator is not easily back driven and further can be used to precisely control the position of the electrode such that a brake is not required. Such an elimination of an element, indicated as critical in the Stiebel patent, is not suggested by the prior art.

Applicant submits that claim 1 is in condition for allowance for all the above reasons. Claims 2-8 depend from claim 1 and are allowable therewith.

Claim 5

In addition to being in condition for allowance as dependent from claim 1, dependent claim 5 further provides that the controller causes the actuator to move the electrode inward when the weld nugget becomes plastic. In this prior Stiebel design, as well as other Stiebel patents, it appears that the hydraulic or pneumatic actuators may cause the electrodes to move inwardly as the force resisting their movement is decreased. However, this is a "passive" action. In the present invention, on the other hand, the controller may "actively" move the electrodes inwardly. For all the reasons above, claim 5 is in condition for allowance.

Claim 6

Dependent claim 6, in addition to being allowable with claim 1, also requires that the controller cause the actuator to apply increased force to the workpiece when the sensor indicates an increase in force due to the weld nugget expansion. Such an active step is not suggested by any of the cited art and provides an additional reason for allowance of claim 6.

Claim 8

Dependent claim 8 stands rejected over the combination of Stiebel, Kanjo and Cox. The Examiner argues that the Cox reference makes it obvious to include a position sensor. However, it does not appear that the Cox reference suggests using a position sensor in an application such as Stiebel, wherein only a force sensor has traditionally been used. For this, and the reasons above, claim 8 is in condition for allowance.

Claim 9

Independent claim 9 stands rejected over the Stiebel and Kanjo references, further in combination with the Cox reference. The Examiner argues that Cox would motivate one of skill in the art to replace the force sensor in Stiebel with a position sensor. However, the Stiebel reference very clearly indicates that a force sensor is important to the operation of the invention as force measurement is a critical aspect of the invention. Neither Cox nor Stiebel recognize the advantage of replacing a force sensor with a position sensor in some embodiments of the present invention. While the position

sensor is advantageous for sensing workpiece deformation, as argued by the Examiner, this does not mean that the prior art motivates the substitution of a position sensor for a force sensor.

Additionally, claim 9 requires that the controller cause the actuator to apply an increased amount of force to the workpiece when the position sensor detects a negative change in position. In other words, the controller and actuator "actively" maintain the position of the electrodes during weld nugget growth. In the Cox reference, on the other hand, it appears that the position sensor is merely used to sense when a weld nugget softens, rather than to maintain the position of the electrodes during nugget expansion by increasing the force applied to the workpiece.

In light of the above, Applicant submits that claim 9 is in condition for allowance. Claims 10-12 depend from claim 9 and are in condition for allowance therewith.

Claim 12

As explained above with respect to claim 5, the cited references do not motivate the "active" step of having the controller cause the actuator to move the electrodes towards one another when the weld nugget becomes plastic. As such, claim 12 is in condition for allowance for this reason, in addition to the reasons for allowance of claim 9.

Claim 13

Independent claim 13, as originally filed, should be allowable for the same reasons argued above with respect to claim 1. However, in order to advance prosecution, claim 13 has been amended in the same manner as claim 1. Therefore, the additional arguments with respect to amended claim 1 apply with respect to claim 13 as well.

Claim 15

The arguments provided above with respect to claim 6 also apply to claim 15, providing an additional reason for allowance of claim 15.

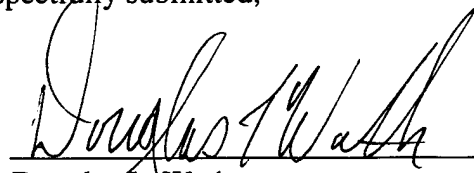
Claims 16 and 17

Claims 16 and 17 are allowable for the same reasons expressed with respect to claim 9 above.

In light of the above, Applicants respectfully submit that all claims are in condition for allowance. Any questions should be directed to Applicants' below signed representative.

Respectfully submitted,

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